

## ABSTRACT OF THE DISCLOSURE

A distribution optical fiber sensor system measures distortion and temperature of a structure with a high spatial resolution. The system has an optical fiber on an object to be measured. A light source emits a first pulse light having a pulse width longer than a transient response of an acoustic phonon and a second pulse light after a time interval during which vibration of the acoustic phonon is maintained thereby supplying the pulse lights to the optical fiber. A detector detects scattering gain spectra of a Brillouin-scattered light created in the optical fiber by the second pulse light at intervals corresponding to twice the time obtained by equally dividing the pulse width of the second pulse light. A controlling/calculating unit calculates distortion and/or temperature based on the scattering gain spectra for sections of the optical fiber corresponding to the scattering gain spectra at the respective time intervals.